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CLAIMS

1. A communication apparatus having a plurality of communication elements that are electrically connected to an electrically conductive layer or an electromagnetic action transfer layer, characterized in that each of the communication elements has a communications capability of conveying a signal via the conductive layer or the electromagnetic action transfer layer to other neighboring communication elements.

2. A communication apparatus having a plurality of distributed communication elements, characterized in that each of the communication elements has such a coverage that allows local communications with other neighboring communication elements, the local communications allowing sequential transmissions of a signal between the communication elements to convey the signal to a target communication element.

3. The communication apparatus according to claim 1 or 2, wherein

no individual conductive wires are formed between the communication elements.

4. The communication apparatus according to any one of claims 1 to 3, wherein

the plurality of communication elements are classified into the first order to the Nth order ranks in ascending order

of communication management capabilities of the elements.

5. The communication apparatus according to claim 4, wherein

the communication elements of each rank function as the first order communication element for conveying a signal to other communication elements that exist within a certain neighboring range therefrom, to realize local communications with the neighboring communication elements.

6. The communication apparatus according to claim 4 or 5, wherein

the Mth order communication elements have at least a function of the (M-1)th order communication elements, which is necessary for communications management, and

the Mth order communication elements can be less densely populated than the (M-1)th order communication elements.

7. The communication apparatus according to any one of claims 4 to 6, wherein

the Mth order communication element manages the (M-1)th order communication elements which are populated within a predetermined range therefrom.

8. The communication apparatus according to claim 7, wherein

the Mth order communication element stores a route to an (M-1)th order communication element that it manages, as a route by way of other (M-1)th order communication elements.

9. The communication apparatus according to any one of claims 4 to 8, wherein

the Mth order communication element stores a route to another Mth order communication element that is placed within a predetermined range therefrom, as a route by way of an (M-1)th order communication element.

10. The communication apparatus according to any one of claims 4 to 9, wherein

the Mth order communication element can serve as a communication element of each of the second to the Mth order ranks, and when functioning as a communication element of a given rank, the Mth order communication element manages a communication element, lower in rank by one, which is placed within a range set in the given rank.

11. The communication apparatus according to any one of claims 4 to 10, wherein

the (M-1)th order communication element stores at least part of the route to the Mth order communication element that manages the (M-1)th order communication element, as a route by way of other (M-1)th order communication elements.

12. The communication apparatus according to any one of claims 4 to 11, wherein

the second order communication element transmits a neighborhood response request, and based on a response returned from the first order communication element that has received the neighborhood response request, the second order communication element sets an ID to the first order

communication element that has returned the response.

13. The communication apparatus according to claim 12, wherein

the second order communication element transmits a neighborhood check request to the first order communication element to which an ID has been set, and the first order communication element that has received the neighborhood check request transmits a neighborhood response request to check for a neighboring first order communication element, and the second order communication element sets an ID to the first order communication element that has returned a response.

14. The communication apparatus according to claim 13, wherein

the second order communication element repeatedly transmits the neighborhood check request to set IDs to and manage an increased number of first order communication elements and successively set routes to the first order communication elements that it manages.

15. The communication apparatus according to any one of claims 12 to 14, wherein

the third or higher order communication elements serve also as a second order communication element to set an ID to a first order communication element.

16. The communication apparatus according to any one of claims 4 to 15, wherein

the third or higher order communication elements can serve as a communication element of each of the third to its own ranks, and transmits a relay neighborhood response request as a communication element of each rank to set a communication element lower in rank by one which is managed in each rank.

17. The communication apparatus according to claim 16, wherein

the third or higher order communication elements set a route to a communication element that is under their management.

18. The communication apparatus according to any one of claims 4 to 17, wherein

a data signal packet includes route data in each rank which is utilized to reach the communication element at the final destination.

19. The communication apparatus according to claim 18, wherein

the route data in the (M-1)th order rank includes data on a route to an Mth order communication element located halfway on the route from the transmitting source communication element to the communication element at the final destination.

20. The communication apparatus according to claim 18 or 19, wherein

the packet includes a receiving element ID for identifying the communication element that is subsequently to

receive the packet.

21. The communication apparatus according to any one of claims 18 to 20, wherein

upon reception of the packet based on the receiving element ID, the communication element sets a receiving element ID of the communication element that is subsequently to receive the packet, and then sends the packet.

22. The communication apparatus according to claim 21, wherein

the communication element sets the receiving element ID in accordance with the route data included in the packet.

23. The communication apparatus according to any one of claims 18 to 22, wherein

upon reception of the packet based on the receiving element ID, each communication element updates the route data and then transmits the packet.

24. The communication apparatus according to any one of claims 4 to 23, wherein

each communication element is assigned an ID, and a higher order communication element refers to an ID included in the packet, thereby determining whether the communication element that is identified by the ID is under its own management.

25. A communication device for transmitting a signal to other communication elements existing within a coverage, the device

comprising first and second signal layers isolated from each other, and a communication element connected electrically to these layers, wherein the coverage is determined in accordance with the resistances of the first and second signal layers and the capacitance between the first and second signal layers, allowing the communication element to transmit a signal by discharging electric charges to the first and/or second signal layer.

26. A communication device for transmitting a signal to other communication elements existing within a coverage, the device comprising first and second signal layers, and a communication element connected electrically to these layers, wherein the first signal layer and the second signal layer are brought into conduction in the communication element, thereby allowing a signal to be transmitted.

27. The communication device according to claim 25 or 26, further comprising a high resistance layer which has a resistance higher than those of the first and second signal layers and which brings these layers into conduction.

28. The communication device according to claim 25 or 26, further comprising a high resistance layer which has a resistance higher than that of the first signal layer and which is electrically connected to the first signal layer, and a power supply layer which is electrically connected to the high resistance layer and which supplies power to the

communication element.

29. The communication device according to claim 28, wherein the coverage is determined in accordance with the resistance of the first signal layer.

30. The communication device according to any one of claims 26 to 29, wherein

the communication element transmits a signal by short-circuiting the first and second signal layers.

31. The communication device according to any one of claims 25 to 30, wherein

the second signal layer is a ground layer that is connected to the ground.

32. The communication device according to any one of claims 25 to 31, wherein

the capacitor of the communication element is charged while no signal is being transmitted.

33. The communication device according to any one of claims 25 to 32, wherein

the first and second signal layers are formed of an electrically conductive flexible body or a meshed object.

34. A method for circuit board implementation, comprising distributing a plurality of circuit elements on an electrically conductive circuit board, the circuit elements each of which has a communications capability of conveying a signal within each predetermined coverage, thereby mounting

the circuit elements on the board without forming individual conductive wires between the circuit elements.

35. A tactile sensor comprising at least one sensor element including a circuit for measuring stress or temperature to convert it into a coded signal, and an electrically conductive flexible structure which conveys an output signal from the sensor element.

36. The tactile sensor according to claim 35, wherein a plurality of signal terminals of the sensor element are connected to an electrically continuous, electrically conductive rubber region of the sensor element.

37. The tactile sensor according to claim 35, wherein the sensor element is provided with two electrodes, which electrically contact two electrically conductive rubber sheets of the elastic structure.

38. The tactile sensor according to claim 35, wherein electrodes of the sensor element electrically contact two or more electrically conductive rubber sheets of the elastic structure by means of pin-shaped projections protruded from the sensor element.

39. The tactile sensor according to claim 35, wherein the sensor element is provided on one surface with two or three electrodes, each of which electrically contacts a plurality of electrically conductive rubber regions formed in a single layer of the elastic structure.

40. The tactile sensor according to claim 35, wherein neighborhood stress is detected in accordance with a variation in capacitance between an LSI chip of the sensor element and an electrode component connected thereto.

41. The tactile sensor according to claim 40, wherein the electrode component connected to the sensor element is supported at an infinitesimal area near its center, thereby allowing the electrode to be deformed with a good sensitivity to an uneven pressure on the surface of the electrode.

42. The tactile sensor according to claim 35, wherein a neighborhood stress is detected in accordance with a variation in resistance of an LSI chip of the sensor element and a pressure-sensitive electrically conductive rubber sheet connected thereto.

43. The tactile sensor according to claim 35, wherein a neighborhood stress is detected in accordance with a variation in the amount of light arriving at an optical sensor on an LSI chip of the sensor element.

44. A communication device which conveys a signal to other communication elements existing within a coverage, comprising first and second signal layers isolated from each other, and a communication element electro-magnetically connected to these layers, wherein the coverage is determined in accordance with an attenuation factor of an electromagnetic wave, and the communication element emits an electromagnetic wave or a beam

of light into the layers including the first signal layer and the second signal layer, thereby transmitting a signal.